HABITAT CONDITIONS

Channel Alterations

Widespread channelization has not been a problem in the Niangua Watershed, although some small channelization projects have been attempted by individual landowners. Occasionally permit applicants have proposed channelization projects in Section 404 applications. In all recent cases the MDC has recommended denial due to the potential negative impacts on aquatic habitat, and the COE has denied these proposals. However, recent changes have occurred in COE authority to regulate excavation in streams including channelization (see Corps of Engineers section).

Unique Habitat

Natural Features Inventories have been completed for counties of the Niangua Watershed by MDC, USFWS, and The Nature Conservancy (Currier, 1989; Currier, 1991; Ryan, 1992). These inventories are ongoing efforts to identify and rank outstanding examples of natural communities, rare or endangered species habitat, and other significant features. The most outstanding of the identified features are subsequently entered in the MDC Natural Heritage Database. A summary of identified aquatic features was prepared for this inventory and assessment (Table 22). The lack of high quality bottomland forest in the watershed is evident. Only one site was classified as "Significant" and four were classified as "Notable". Nine proposed bottomland forests were rejected due to recent logging or overgrazing. Only one wetland feature, a small pond shrub swamp, was identified as "Significant". No wetlands were considered "Exceptional", and six sloughs were considered "Notable".

Ninety miles of known range was designated as "critical habitat" for the Niangua darter, Etheostoma nianguae, when it was listed as a federally threatened species in 1985 (Pflieger, 1989c). The designated critical habitat did not include all of the known range at the time, and its range has been extended by new observations since 1985. The Niangua watershed includes 85 of the 226 miles of current known range for the darter. There are only eight known populations of Niangua darters, all within the northwestern Ozarks. Two of these populations are within the Niangua Watershed, one in the upper NR and the other in the LNR. The Niangua darter typically inhabits medium-sized streams with moderate gradients and clean gravel/rubble substrates. Within the NR, darters have been observed in the main stem and in Greasy Creek. In the LNR, they have been observed in the main stem, Thomas Creek, Cahoochie Creek, and Starks Creek. Reservoir construction, sedimentation, nutrification, and introduction of non-native species are perceived to be the greatest threats to the Niangua darter (Pflieger, 1989c). Recovery efforts have emphasized habitat restoration and preservation as the best means of saving this species in the Niangua Watershed and throughout its range. These efforts have included public education, cost share programs to control streambank erosion and nutrient runoff, thorough review of proposed Section 404 permits, and acquisition or easements for stream frontage in critical areas. A condition prohibiting excavation during the spawning season, March 15 through June 15, is included in all general permits issued in Niangua darter range. In the past three years, several stream improvement projects have been completed in Niangua darter habitat; donated and purchased stream frontage has been added to the Mule Shoe CA; and a protective easement has been obtained opposite the Mule Shoe CA.

Large springs provide cold-water habitat on 15.5 miles of streams in the Niangua Watershed. Two miles of Bennett Spring Branch; 6.0 miles of the NR; and 1.5 miles of Mill Creek are classified as cold-water fisheries (Table 14). Approximately 12 miles of the NR support trout populations, and trout are

Table 22. Summary of Natural Features Inventories within a Niangua Watershed

Significant aquatic features						
Streams with Niangua darter habitat (Niangua River, Little Niangua River, Starks Creek, Thomas Creek, Cahochie Creek)	5					
Gray bat roosts						
Springs (Bennett Spring, Ha Ha Tonka Spring)						
Mesic Bottomland Forest	1					
Great blue heron rookery	1					
Pond shrub swamp	1					
TOTAL	15					
Exceptional aquatic features						
Great blue heron rookeris	4					
Springs and spring branches	3					
Streams with Niangua darter habitat (Greesy Creek)						
TOTAL	8					
Notable aquatic features						
Sloughs	6					
Great blue heron rookeris	5					
Springs and spring branches	4					
Mesic bottomland forests	4					
Waterfalls	1					
Caves	1					
TOTAL	21					

Significant features= Biologic or geologic element of such high-quality size and/or rarity that it is of statewide importance Exceptional features= High-quality natural communities, extant rare species sites, or other special features which increase the preservation value of an area, but are of regional rather than statewide importance. Notable features= Sites of local interest only, and by themselves are not targeted for preservation.

occasionally observed at Charity CA. Water temperature was monitored in the NR in 1994, 1995, and 1996 to determine maximum temperatures attained. In 1994, four sites between 6.6 miles (SM 72.5) and 9.2 miles downstream from Bennett Spring Branch were monitored. The maximum temperatures recorded between July 22 and August 23 ranged from 70.0EF at the most upstream site to 72.0EF at the most downstream site. Two sites were monitored in 1995 between August 18 and November 8. The highest temperature recorded at SM 75.1 was 72.6E and at SM 77.3 it was 74.0EF. The data from 1996 was not available at this printing. In 1990, monitors were placed at three locations in the vicinity of Charity CA to access the site for the possible introduction of trout. The monitors were checked weekly to determine the maximum and minimum temperatures recorded between July 2 and August 20. The maximum recorded at the most upstream station (SM 111.5) was 85 °F and temperatures in the upper 70s were recorded at the downstream sites (SM 114.2 and SM 115.1). Since summer temperatures were marginal for trout and because the Niangua darter, an endangered species, could be found near this site, the area is managed for native species. On LOZ, Ha Ha Tonka Spring provides a plume of cool water in the Niangua Arm that attracts striped bass and hybrid striped bass.

There are numerous shallow, fishless ponds on public lands that offer otherwise scarce habitat for amphibians, and also provide wildlife watering. Many amphibians require such ponds for successful reproduction. Fishless ponds on public lands include: two ponds on the Niangua CA in Webster County; one at the Gale CA; 17 ponds at Muleshoe CA in Hickory County completed, and 21 ponds at Lead Mine CA.

Lake of the Ozarks Habitat

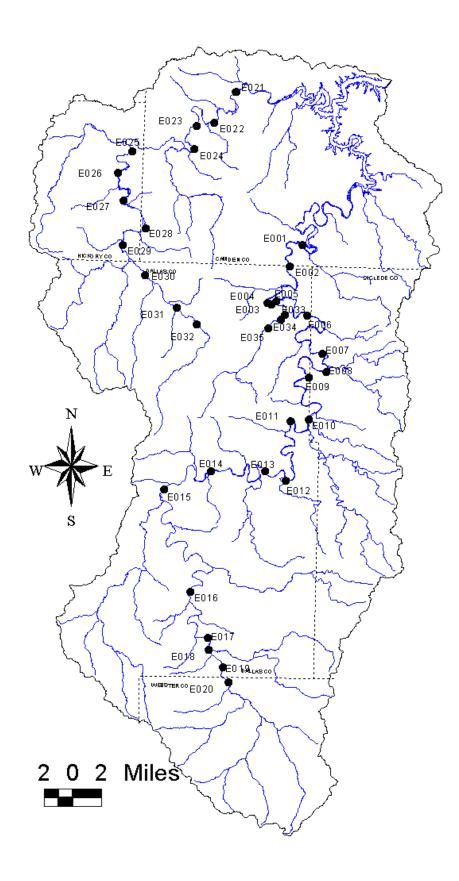
The upper parts of the Niangua and Little Niangua arms of LOZ are stream-like in nature with well-defined channels, continuous current, and pool-riffle sequences when the lake is at or below normal level (660 feet). These areas contain a much greater amount of large woody cover than do areas further downstream. This stream character rather abruptly changes to a delta-like area which is characterized by a poorly-defined channel and sluggish current. These areas are typically wide and shallow, and contain a fair amount of woody structure. They are greatly affected by elevational changes in LOZ with a high percentage exposed during winter drawdown. Areas downstream from the deltas can be considered typical "lake" habitat. Main channel depth ranges from eight to ten feet upstream to 40-50 feet at the junction of the Niangua and Little Niangua. The majority of banks in this area are steeply sloping and covered with course gravel or chunk rock. Several vertical rock bluffs are present. In recent years, water level fluctuations have ranged from six to eight feet. At the lower levels the shallow back ends of most coves are exposed. The majority of the standing timber was removed from the LOZ watershed prior to impoundment, so a great deal of woody structure (brush piles) has been added by anglers. The brush piles are composed of cedars or hardwood branches that are typically anchored in place with rocks or cinder blocks. In some areas, trees near the shore have been cut and allowed to fall into the water. Some of the trees in LOZ wash in from tributaries or fall into the water along the shore.

Stream Habitat Assessment

Following Bovee (1982), sites were selected by fisheries management staff for stream habitat assessment in the Niangua Watershed (Table 28, Figure 21). Assessments were completed between August 1990 and September 1991 and are summarized below. Complete habitat summaries for the NR main stem, LNR, and Jakes Creek are also provided in Appendix F.

Streambank erosion was a problem in all streams sampled in the Niangua Watershed. There were no

Figure 21. SHAD survey sites within the Niangua River Watershed.



clear differences in the pattern of bank erosion between upstream or downstream reaches. Stream reaches with the most extensive bank erosion problems were usually areas with little or no wooded riparian zone and poorly vegetated banks. Areas bordering riparian zones with little or no woody vegetation were usually pasture. Cattle grazing was evident at many survey sites, and in grazed riparian zones the woody vegetation was usually limited to mature trees with little undergrowth. In stream fish cover in pools consisted mainly of snag habitat such as rootwads and logs. Woody cover was limited along those reaches where there was little or no riparian zone present. Boulders were present in most of the NR mainstream sites and many of the downstream LNR sites. Riffle areas offered cobble and boulders, as well as water willow, as primary cover types. Undercut banks, including overhanging bedrock shelves, were present at some sites and appeared to be providing quality fish habitat. Stream depths in pools were rated fair at almost all habitat sampling sites. Increased depth associated with snags and boulders was documented at several sites. However, at many sites pool depth appeared to be lacking due to a heavy gravel bedload. The maximum depth at most sites was six feet or less.

Gravel and cobble were the predominant substrate at all sample sites. Cobble was predominant in riffle areas. Little silt or other fine substrate was found, and when it did occur, it was usually in a strip near the bank, in pools, or in backwater areas. Streambeds were unstable and uniform along areas associated with in stream activities such as gravel excavation. Only two sampling sites showed any sign of channel alterations, both were old mill dams. Gravel excavation was not evident at any of the 35 sampling sites, although gravel excavation is known to occur throughout the Niangua Watershed.

Most stream habitat sampling sites had no apparent water quality problems. At sites where overgrazing was evident water clarity was poor and an abundance of algae was noted. In general, water was clear with limited algae during the sampling period as might be expected from Ozark border streams. NR sites within a few miles downstream from Buffalo exhibited a milky turbidity that may be attributed to runoff from a limestone quarry within 0.5 miles of the river.

Habitat Improvement Projects on Public Lands

Several stream improvement projects have been completed on public lands to treat erosion problems and improve fish habitat (Table 23, Figure 22). These visible projects promote environmentally sound stream management practices as part of the MDC Streams for the Future goals. In April 1990, 13 boulders were installed to improve fish habitat in Bennett Spring Branch, approximately 0.25 miles downstream from Bennett Spring, within Bennett Spring State Park in Dallas County. A single boulder was installed along with two clusters of three boulders and one cluster of six boulders. The boulders (three to four feet in diameter) were placed in a reach approximately 200 feet long using a dragline. The smoothest surface of each boulder was pointed upstream. The clusters were set in a "Y" configuration with the point facing upstream. Boulders in the clusters were spaced from two to six feet apart. To avoid causing streambank erosion, a minimum of six feet was maintained between the boulders and the nearest

streambank. The main purpose of the boulder installations was to enhance trout habitat by providing in stream cover and diversifying water depths and velocities in the reach. Other objectives of this project included: evaluating boulders as a habitat enhancement practice for use in cold-water and warm-water streams; diversifying angling opportunities in the area; discouraging future bedload deposition in the reach during high flow events; and reducing the frequency and extent of dredging required in this reach. Inspections in

August 1994 revealed that most installations were performing the desired functions although a few

Figure 22. Stream improvement projects on public and private land within the Niangua River Watershed.

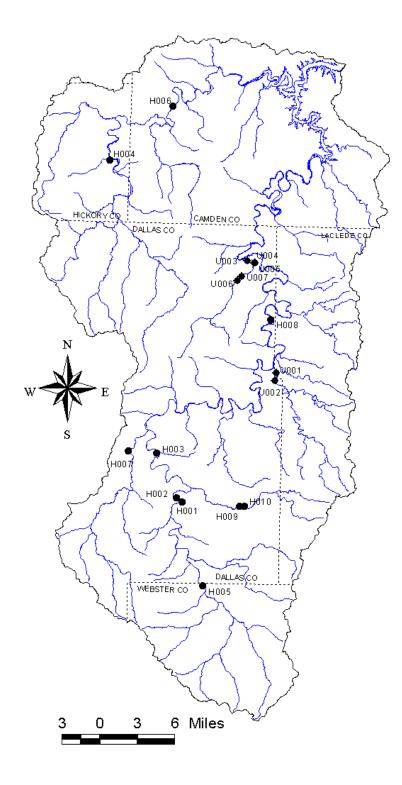


Table 23. Stream improvement projects on public lands within the Niangua Watershed.

Site	Date	Stream	Twp	Rng	Sec	Practices	Miles Affected
U001	03/08/95	Bennett Spring Branch	35	17	31	Revetment and 2 gully plugs	0.05
U001	04/09/90	Bennett Spring Branch	34	18	01	Boulder placement	0.05
U003	06/21/91	Jakes Creek	36	18	15	Cedar tree revetment Rip-rap	*
U004	06/21/91	Jakes Creek	36	18	14	Cedar tree revetment	*
U005	06/21/91	Jakes Creek	36	18	15	Cedar tree revetment	*
U006	06/21/91	Jakes Creek	36	18	22	Cedar tree revetment	*
U007	06/21/91	Jakes Creek	36	18	28	Cedar tree revetment	*

^{*0.1} total for five revetments

boulders had been undercut by scouring or covered by gravel deposition to the extent that they were ineffective. In March 1995, a 120-foot cedar tree revetment, and two gully plugs were installed in Bennett Spring Branch within the State Park in Laclede County. The revetment was installed in Zone 3, approximately 1.0 miles downstream from Bennett Spring. A single row of 15- to 20-foot cedar trees were anchored at the toe of the bank to slow streambank erosion and allow woody vegetation to become established on the bank. Cedar trees were also anchored in two gullies adjacent to the revetment. Gully plugs help control down cutting and create sediment deposition by decreasing velocity. The vegetated riparian zone will also be improved by moving a parking lot and planting trees. Future projects proposed in the Stream Management Plan include the installation of gravel traps in Bennett Spring Branch, upstream from Bennett Spring. These will help catch excess bedload before it reaches the park, thereby reducing the need for periodic gravel removal to maintain trout habitat and diversify angling opportunities.

In June 1991, five cedar tree revetments totaling 495 feet, and a 50 foot-long rock rip-rap revetment were completed on Jakes Creek within MDC's Lead Mine Conservation Area in Dallas County. Each cedar tree revetment consisted of a single row of 15- to 20-foot cedar trees anchored at the toe of the bank to slow streambank erosion and allow woody vegetation to become established on the bank. Rip-rap was placed on a 2:1 slope to stop erosion and allow woody vegetation to become established on the bank. These installations are performing satisfactory with minor maintenance and provide demonstration areas promoting stream enhancement practices related to the MDC's Streams For The Future Program. The width of vegetated riparian zones in the area has been increased to at least 100 feet to provide root systems that will ultimately hold the streambanks and provide long-term streambank stability.

Streambank stability will continue to be monitored on state lands. Appropriate streambank stabilization techniques, including cedar tree revetments, rip-rap, log barbs, rock barbs, willow staking, riparian zone expansion, and tree planting, will be used to control future erosion problems as necessary.

Habitat Improvement Projects on Private Lands

MDC assistance to stream side landowners within the Niangua Watershed has included: technical assistance; Technical Assistance With Cost Share, a three year (1991-1993) pilot program; Equipment Loan Projects; Landowner Cooperative Projects (LCPs); an Upper Niangua Demo-Farm Project; Partners for Wildlife (PFW) projects, a joint project between the MDC and USFWS in Niangua darter habitat; and the Streams for the Future

Landowner Incentive Program. These programs and thirteen projects initiated within the watershed (Table 30; Figure 22) are described in the following sections.

The first private landowner stream contact in the Niangua Watershed was made in June 1989. Since that time numerous contacts have been made with stream-side landowners in the watershed. As of February 1997, 68 landowner contacts have been made with onsite visits culminating in site-specific recommendations. The vast majority (90%) of the contacts were initiated due to concerns about bank erosion. Other contacts have included developing Alternative Watering Systems (AWS) (6%), creating trout habitat (3%), and addressing flooding problems (1%).

The leading cause of bank erosion on private lands in the watershed has been the loss of quality riparian zones. The most common recommendations to landowners have included: establish and maintain riparian zones (typically 100 feet wide); exclude livestock from riparian zones and the stream channel; and

revegetate stream banks. In a few cases when conditions were favorable, cedar tree revetments were recommended to protect banks until woody vegetation was established.

Technical Assistance Projects

Technical assistance was provided for three projects that landowners completed with their own resources (sites H007, H008, H010; Table 30). At least one landowner completed a stream improvement project without agency assistance - bank back sloping and revegetation (site H009). It is likely that there are other similar projects that remain undocumented.

Technical Assistance With Cost Share Projects

Technical Assistance With Cost Share was a cooperative pilot program between the MDC and the MDNR. It was an incentive program designed to determine if landowners would install stream improvement structures when provided appropriate financial incentives. The goal was to offer a financial incentive to create stable, healthy stream channels and stream riparian zones to benefit all Missourians. Dallas County was one of six counties in the state to offer the program for three years (1991-1993). During the three years, 132 stream-side landowners were contacted by either direct mailing or telephone calls, to increase awareness and offer assistance through this program. Seventy of the landowners were located along the NR, 61 on the LNR, and one on Dousinbury Creek. Five of the seven landowners that responded applied for the program, and three actually signed agreements to implement the recommended practices (sites H001-H003; Table 30). All three participating landowners are located within federally designated critical habitat of the Niangua darter on the NR. Collectively, 2.7 miles of stream were directly protected by the improvement practices. In addition, as a result of the mailing, 0.25 miles of stream frontage was acquired on the LNR (Mule Shoe CA) to protect Niangua darter habitat. The pilot program provided experience necessary for formulating the statewide incentive program which was initiated in October 1996.

Equipment Loan Projects

Equipment Loan Projects were available to landowners needing specialized equipment to implement recommended stream improvement practices. One landowner within the Niangua Watershed participated with Equipment Loan assistance (site H006; Table 30). The project also included volunteer help by a local Stream Team (ST #313) to plant a 100 foot-wide, and 1,080 foot-long riparian zone along the LNR.

Landowner Cooperative Projects (LCPs)

LCPs are stream improvement projects that are jointly installed by the MDC and private landowners and are available statewide. The goal of LCPs is to create demonstrations of stream improvement practices that encourage stable, healthy stream channels and stream riparian zones, and are available for viewing by agricultural agencies, other landowners and educational groups. Two landowners, within the Niangua Watershed have participated in LCPs (sites H004 and H005; Table 30). Both projects have included the installation of cedar tree revetments, livestock exclusion and revegetation of riparian zones, and one included the installation of a solar watering system for cattle.

Partners for Wildlife Projects

In Fall 1995, the MDC and the USFWS entered into a cooperative agreement that included the Partners for Wildlife (PFW) Project. Through the project, cost share incentives are available for eligible practices

in Niangua darter range, including livestock exclusion, planting or revegetation of riparian zones, and alternative watering sources for livestock. By March 1997, two such projects (H011 and HO12) had been completed, an additional agreement had been recently signed, and a fourth agreement was being negotiated.

Upper Niangua Demo-Farm Projects

Five farms in the Upper Niangua Watershed were picked to demonstrate good land stewardship practices. Four of the farms do not include stream frontage, so MDC assistance was not provided. The largest Demo-Farm (HO13) included MDC and NRCS (DSP3 incentives) assistance to install a Management Intensive Grazing (MIG) system. The project included the installation of: 7,300 feet of fencing for livestock exclusion and establishment of a riparian zone (18 acres); a well using existing utilities; 9,650 feet of pipeline; nine hydrants; and eight frost-free water tanks. The project will protect 0.6 miles of the Niangua River within Niangua darter critical habitat and 0.8 miles (both sides) of an unnamed tributary.

Streams for the Future Landowner Incentive Program

A comprehensive statewide MDC incentive program was initiated in July 1996 to help landowners install stream improvement practices. The program consists of three parts. Stream Watershed Restoration Projects (SWRP) are available in targeted watersheds selected by fisheries management personnel, often including SALT or EARTH project areas. These projects may include incentives for setting aside riparian management zones; small wetland development; alternative watering systems; and stream restoration such as tree or rock revetments, grade control structures, habitat structures, rock or log barbs, and back sloping. Alternative Watering Sources for Planned Grazing Systems (PGS) are available in any county offering SWCD DSP3 incentives, and can include pond construction and reconditioning, solar water systems, hydraulic ram pumps, and conventional wells, as well as fencing for livestock exclusion. Stream Stewardship Agreements (SSA) can provide yearly payments for ten years for perpetual easements that protect good quality stream corridors. Initial landowner and agency participation in these incentives, especially the PGS incentive, suggests that this program will be popular in the Niangua Watershed.

Tunnel Dam Habitat Improvement

Habitat in the bypass loop below Tunnel Dam and in Lake Niangua has been improved by new requirements included in the 1994 FERC relicensing agreement. Sho-Me Power Corporation is required, except during emergencies, to maintain a minimum flow of 60 cfs during the spring spawning season and 40 cfs the balance of the year. The utility is also required to limit draw down of the lake level to 0.5 feet to avoid low dissolved oxygen conditions.